



Spatial distribution of metallic trace elements in the soils of Mayanga market garden sites in Brazzaville (Congo)

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ABSTRACT

Objective: This study focused on the assessment of trace metal element (MTE) contamination risks of soils in the Brazzaville vegetable belt, subject to intensification of cultural practices and urban expansion.

Methodology and results: To determine the MTEs (Pb, Cd, Cr, Cu and Ni), 54 composite soil samples were collected systematically from 54 plots of 1 ha each at the three sites of Mayanga vegetable sector (Bikakoudi, Wayako and Mahouna). The concentrations of MTE vary between 50 and 125 mg.kg⁻¹ for Pb, between 10 and 15 mg.kg⁻¹ for Ni, between 30 and 40 mg.kg⁻¹ for Cu and between 0.4 and 0.8 mg.kg⁻¹ for the Cd. The order of accumulation of MTE in the soils is Pb > Cu > Ni > Cr > Cd. The Pb and Cd contents at the Bikakoudi site are 2 to 3 times higher than the values allowed by the European standard of European Commission Director General Environment (ECDGE, 2004) while the other trace elements have contents lower than the accepted amount (40 mg.kg⁻¹ for Pb, 20 mg.kg⁻¹ for Cu, 15 mg.kg⁻¹ for Ni, 30 mg.kg⁻¹ for Cr and 0.4 mg.kg⁻¹ for Cd). The contamination of certain plots is linked to the use of household waste sludge and to road and railway traffic that are close to these sites. The pollution indices show that nearly 40% of plots studied, on the Bikakoudi site, have low pollution values, to be monitored in order to limit the contamination risk of crop.

Conclusion and application of results: The Bikakoudi site is the most exposed to the risks of pollution by MTEs. However, the potential ecological risk factor is very low for all the MTEs studied. In the future, studies should focus on speciation of MTEs and their transfer to cultivated plants.

Keywords: Congo, Brazzaville, soils, urban market gardening, MTE mapping, pollution index.